

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : KANEGAFUCHI CHEM IND CO LTD

(72)Inventor : MANABE TAKAO  
SAKAGUCHI MASAFUMI  
TAKASE JUNJI

(54) CURABLE CONDUCTIVE COMPOSITION AND CONDUCTIVE RUBBER ROLLER MADE BY USING IT

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a curable conductive composition which can meet the requirement for lowering the hardness of a rubber-like elastic material used for a conductive material without using a large quantity of an oil or the like and which can give a rubber-like elastic material having low hardness with low risk of bleeding or the like, and to obtain a conductive roller with low hardness from the composition.

SOLUTION: The curable conductive composition consists of (A) a saturated hydrocarbon polymer or polyoxyalkylene polymer having at least one alkenyl group capable of undergoing hydrosilylation in the molecule, (B) a compound having 2 to 5 hydrosilyl groups in the molecule, (C) a material for imparting conductivity, such as carbon black, and (D) a hydrosilylation catalyst. This composition is molded around a metal shaft and thermally cured to form the conductive elastic layer of a conductive roller.

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CLAIMS

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[Claim(s)]

[Claim 1] The hardenability conductivity constituent which becomes considering following component (A) - (D) as an indispensable component.

(A) (Compound C) addition-of-conductivity (matter D) hydrosilylation catalyst which has 2-5 hydrosilyl radicals in the saturated hydrocarbon system polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible, or the polyoxyalkylene series (polymer B) molecule [claim 2] (A) The hardenability conductivity constituent according to claim 1 which the alkenyl radical in which a hydrosilylation reaction is possible comes to contain at the molecule end among the polymer of a component.

[Claim 3] (A) The hardenability conductivity constituent according to claim 1 or 2 whose component is a polyisobutylene system polymer.

[Claim 4] (A) The hardenability conductivity constituent according to claim 3 whose total amount of the repeat unit which originates in an isobutylene among the polymer of a component is 50 % of the weight or more.

[Claim 5] (A) The hardenability conductivity constituent according to claim 1 or 2 whose polymer of a component is a polyoxypropylene system polymer.

[Claim 6] (B) The hardenability conductivity constituent according to claim 1 to 5 which is the polyorgano hydrogen siloxane to which the compound of a component contains 2-5 hydrosilyl radicals in 1 molecule on the average.

[Claim 7] The silicon atomic union hydrogen atom of the compound of a component receives the alkenyl radical total amount of the (A) component. (B) 0.8-5Eq, (C) The matter of a component receives the polymer 100 weight section of the (A) component. 0.1 - 200 weight section, (D) Hardenability conductivity constituent according to claim 1 to 6 which blends the - (D) component (aforementioned [ A ]) and becomes so that the catalyst of a component may serve as the range of 10-1 to ten - eight mols to one mol of alkenyl radicals of the polymer of the (A) component.

[Claim 8] (C) The hardenability conductivity constituent according to claim 1 to 7 whose addition-of-conductivity matter of a component is carbon black.

[Claim 9] The hardenability conductivity constituent according to claim 1 to 8 whose degree of hardness (JIS A) of the constituent after hardening is 20 degrees or less.

[Claim 10] The conductive platen which comes to use a hardenability conductivity constituent according to claim 1 to 9 as an elastic body.

[Claim 11] The conductive platen according to claim 10 whose resistance of a roller is 107-1011ohm.

[Claim 12] The conductive platen according to claim 10 whose resistance of a roller is 103-109ohm.

[Claim 13] The conductive platen according to claim 10 whose resistance of a roller is 105-1010ohm.

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## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the hardenability conductivity constituent for manufacturing the elastic body used for a conductive ingredient, and the conductive platen using it. further -- detailed -- addition mold-curing nature -- it is -- a hardened material -- low -- it is related with the conductive platen using degree of hardness hardenability conductivity constituent and it.

[0002]

[Description of the Prior Art] As one application of a conductive ingredient, the various rollers which an electrophotography machine and a printer have are mentioned. As an elastic body of these rollers, although many EPDM, urethane, NBR, silicone, etc. are used, low degree-of-hardness-ization other than the property which each elastic body has has come to be needed.

[0003] Moreover, although already opened to the public in JP,8-262866,A etc. about the conductive constituent using a saturated hydrocarbon system polymer or a polyoxyalkylene series polymer, in this conductive constituent, there was not the thing that has a not necessarily low degree of hardness but the need for the further reduction in a degree of hardness.

[0004]

[Problem(s) to be Solved by the Invention] this invention solves the problem of the reduction in a degree of hardness in the rubber-like elasticity object used for a conductive ingredient, without using a lot of oil etc., and risks, such as bleeding, are low -- low -- the conductive platen using the hardenability conductivity constituent and it which can acquire a degree of hardness rubber-like elasticity object is offered.

[0005]

[Means for Solving the Problem] in the hardenability ingredient which consists of components, such as a saturated hydrocarbon system polymer which has the alkenyl radical in which a hydrosilylation reaction is possible or a polyoxyalkylene series polymer, a curing agent which has a hydrosilyl radical, and a hydrosilylation catalyst, as for this invention persons, the number of hydrosilyl radicals makes hydrosilylation crosslinking density small, using 2-5 things as said curing agent -- low -- it came to complete a header and this invention for a degree of hardness rubber-like elasticity object being acquired.

[0006] namely, this invention -- following component (A) - (D) -- as an indispensable component -- becoming -- low -- it is a conductive platen using the hardenability conductivity constituent and it which can acquire a degree of hardness rubber-like elasticity object.

(A) (Compound C) addition-of-conductivity (matter D) hydrosilylation catalyst which has 2-5 hydrosilyl radicals in the saturated hydrocarbon system polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible, or the polyoxyalkylene series (polymer B) molecule [0007]

[Embodiment of the Invention] The (A) component in the hardenability conductivity constituent of this invention is the saturated hydrocarbon system polymer or polyoxyalkylene series polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible. Here, it will not be restricted especially if said alkenyl radical is a radical including carbon-carbon duplex association which has activity to a hydrosilylation reaction. As an alkenyl radical, ring type unsaturated hydrocarbon radicals, such as aliphatic series partial saturation hydrocarbon groups, such as a vinyl group, an allyl group, a methylvinyl radical, a propenyl radical, a butenyl group, a pentenyl radical, and a hexenyl radical, a cyclo propenyl radical, a cyclo butenyl group, a cyclo pentenyl radical, and a cyclohexenyl group, an methacrylic radical, etc. are mentioned.

[0008] (A) As for a component, it is desirable to introduce into the polymer end the alkenyl radical in which the above-mentioned hydrosilylation reaction is possible. Thus, when an alkenyl radical is in a polymer end, it is desirable from points, like the rubber-like hardened material of high intensity becomes the effective network chain density of the hardened material finally formed increases, and is easy to be obtained.

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JP,2000-309709,A [DETAILED DESCRIPTION]

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at 500-50,000, and a pan in the viewpoint received the balance of reactivity and the reduction in a degree of hardness to number average molecular weight (Mn). Especially, to a with a number average molecular weight of 5,000 or more thing and a pan, what is 5,000-40,000 is desirable. When number average molecular weight is less than 500, and this hardenability constituent is stiffened, sufficient mechanical property (a rubber degree of hardness, elongation percentage) etc. becomes is hard to be acquired. It is in the inclination for hardening to become inadequate in many cases in order that the molecular weight per alkenyl radical contained in a molecule when number average molecular weight becomes not much large on the other hand too much may become large or reactivity may fell by steric hindrance, and for viscosity to become high too much, and for workability to worsen.

[0018] Although there is especially no limit in the alkenyl radical which said oxy-alkylene system polymer has, it is following general formula (1)  $H_2C=C(R1)-CH_2-$ , (1)

(-- R1 has among a formula the desirable alkenyl radical shown by hydrogen atom or methyl group) at especially the point of excelling in hardenability.

[0019] Moreover, one of the descriptions of this hardenability constituent is easy to set the rubber-like elasticity object acquired after hardening as a low degree of hardness, if the number of alkenyl radicals has two or more desirable pieces at the molecule end for demonstrating this description and the number of alkenyl radicals increases too much as compared with the molecular weight of the (A) component, it will become upright, and good rubber elasticity becomes is hard to be obtained.

[0020] As a compound which has the hydrosilyl radical which is the (B) component of this invention, if 2-5 hydrosilyl radicals are contained in intremolecular, there will be especially no limit in the class. Here, the number of said hydrosilyl radicals is calculated by the number of silicon atomic union hydrogen atoms, and also when two hydrogen atoms have combined with the same silicon atom, a hydrosilyl radical calculates it with two pieces.

[0021] (B) As a component, although a polyorgano hydrogen siloxane is desirable, it is mentioned as one. A polyorgano hydrogen siloxane here points out the siloxane compound which has a hydrocarbon group or a hydrogen atom on a silicon atom. It is [0022] when the structure is shown concretely.

[Formula 1]

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[0009] By this invention, a saturated hydrocarbon system polymer is a concept meaning the polymer which does not contain carbon-carbon unsaturated bonds other than a ring substantially, and means that the repeat unit which constitutes the principal chain except this alkenyl radical consists of hydrocarbon groups. (A) The polymer which makes the frame of the saturated hydrocarbon system polymer of a component (1) It carries out a polymerization, using the olefin compound of the carbon numbers 2-6, such as ethylene, a propylene, 1-butene, and an isobutylene, as the main monomer. (2) Although it can obtain by the approach of hydrogenating after -- carrying out homopolymerization of the diene series, such as a butadiene and an isoprene, or carrying out copolymerization of the above-mentioned olefinic compound and the diene series It is desirable that it is the polyisobutylene system polymer from the point of being able to make [ many ] the number of end functional groups, hydrogenation poly-butadiene system polymer, or hydrogenation polyisoprene system polymer which is easy to introduce a functional group into an end and which is easy to carry out molecular-weight control.

[0010] the monomeric unit in which all the monomeric units may be formed in from the isobutylene unit, and said polyisobutylene system polymer has an isobutylene and copolymeric -- a polyisobutylene system polymerization -- the inside of the body is desirable and you may contain in 20% or less of range preferably especially 30% or less still more preferably below 50% (% of the weight and the following -- the same).

[0011] As a monomer component which has copolymeric [ said / isobutylene and copolymeric ], the olefin of carbon numbers 4-12, vinyl ether, an aromatic series vinyl compound, vinylsilane, and arylsilane are mentioned, for example. As an example of such a copolymer component, for example 1-butene, 2-butene, A 2-methyl-1-butene, a 3-methyl-1-butene, a pentene, 4-methyl-1-pentene, A hexene, a vinyl cyclohexane, the methyl vinyl ether, ethyl vinyl ether, isobutyl vinyl ether, styrene, alpha methyl styrene, dimethyl styrene, p-t-butoxy styrene, p-hexenyloxy styrene, p-ant ROKISHI styrene, p-hydroxystyrene, beta-pinene, an indene, vinyldimethylmethoxysilane, A vinyl trimethyl silane, divinyl dimethoxysilane, divinyl dimethylsilane, 1, 3-divinyl - 1, 1, 3, and 3-tetramethyl disiloxane, TORIBI nil methylsilane, A tetravinyl silane, allyl compound dimethyl methoxysilane, an allyl compound trimethyl silane, Diaryl dimethoxysilane, diaryl dimethylsilane, gamma-methacryloyl oxypropyl trimethoxysilane, gamma-methacryloyl oxypropyl methyl dimethoxysilane, etc. are mentioned.

[0012] Other monomeric units other than the monomeric unit used as a principal component as well as the case of the above-mentioned polyisobutylene system polymer may be made to contain also in said hydrogenation poly-butadiene system polymer or other saturated hydrocarbon system polymers.

[0013] moreover, a monomeric unit by which double association remains in the saturated hydrocarbon system polymer used as a (A) component in this invention in the range in which the purpose of this invention is attained after the polymerization like a polyene compound like butadiene, isoprene, 1, 13-tetra-deca diene, 1, 9-deca diene, 1, 7-OKUTA diene, 1, and 5-hexadiene -- small quantity -- you may make it contain in 10% or less of range preferably

[0014] As for the number average molecular weight (the GPC method, polystyrene conversion) of an isobutylene system polymer, a hydrogenation polyisoprene system polymer, or a hydrogenation poly-butadiene system polymer, it is preferably desirable said saturated hydrocarbon system polymer and that it is 2000 to about 5000 from the point of the rubber elasticity after hardening in the ease of dealing with it.

[0015] The approach of making the compound which has a partial saturation radical react to the polymer which has functional groups, such as a hydroxyl group which is indicated by JP,3-152164,A and JP,8-134220,A, as the manufacture approach of the saturated hydrocarbon system polymer as a (A) component in the hardenability conductivity constituent of this invention, and introducing a partial saturation radical into a polymer is mentioned. Moreover, the approach of using together the further aforementioned alkenyl radical installation approach after carrying out the approach of performing an Friedel Crafts reaction, a bottom allyl compound of Lewis acid existence trimethyl silane, etc. the approach and the various phenols which perform a substitution reaction, and an Friedel Crafts reaction to introducing a partial saturation radical into the polymer which has a halogen atom and introducing a hydroxyl group etc. is mentioned. [ alkenyl phenyl ether ] The approach of introducing a partial saturation radical at the time of the polymerization of a monomer which is furthermore indicated by a U.S. Pat. No. 4316973 official report, JP,63-105005,A, and JP,4-288309,A is also possible.

[0016] Moreover, the unit from the compound which is used as starting material at the time of polymer manufacture as a unit which 50% or more says the polymer which consists of an oxy-alkylene unit, and contains in addition to an oxy-alkylene unit and which has two or more active hydrogen, for example, ethylene glycol, a bisphenol system compound, a glycerol, trimethylol propane, pentaerythritol, etc. is preferably mentioned by this invention 30% or more of the unit from which said polyoxyalkylene series polymer of the (A) component constitutes a principal chain. In addition, you may be a copolymer (a graft polymer is also included) with the unit which consists of ethylene oxide, butylene oxide, etc. in the case of a polyoxypropylene system polymer.

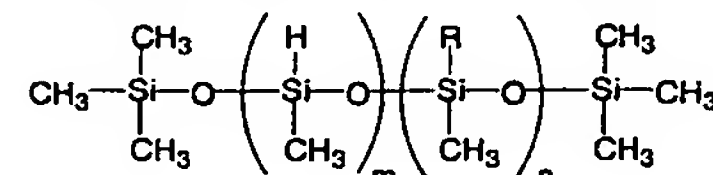
[0017] As molecular weight of the above polyoxyalkylene series polymers, it is desirable that it is 1,000-40,000

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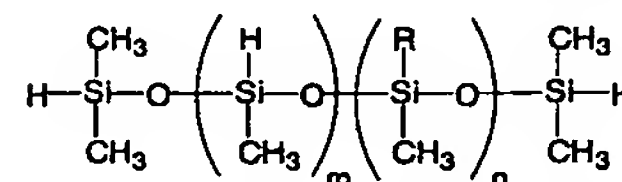
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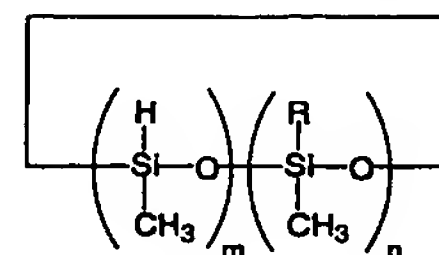
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( $2 \leq m+n \leq 50$ ,  $2 \leq m \leq 5$ ,  $0 \leq n$ , Rとしては主鎖の炭素数が2~20の炭化水素で1個以上のフェニル基を含有してもよい.)



( $0 < m+n \leq 50$ ,  $0 \leq m \leq 3$ ,  $0 \leq n$ , Rとしては主鎖の炭素数が2~20の炭化水素で1個以上のフェニル基を含有してもよい.)



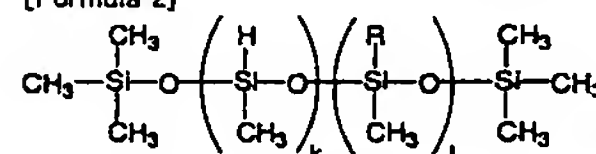
( $3 \leq m+n \leq 20$ ,  $2 \leq m \leq 5$ ,  $0 \leq n < 18$ , Rとしては主鎖の炭素数が2~20の炭化水素で1個以上のフェニル基を含有してもよい.)

[0023] The shape of a chain shown by \*\*\* and an annular thing are mentioned.

[0024] Moreover, if in charge of use of these (B) components, what has good compatibility with the (A) component, the (C) component, and the (D) component or the distributed stability in a system is desirable. When especially the viscosity of the whole system is low and what has compatibility low as a (B) component with each above-mentioned component is used, phase separation happens and poor hardening may be caused. Moreover, a filler with small particle size, such as an impalpable powder silica, may be blended as a dispersibility assistant. Furthermore, in order to improve the conductive tuck and the reinforcement of a rubber-like elasticity object which are obtained, two or more sorts of curing agents may be used together. In this case, there is especially no limit in the curing agent used together that the compound which has 2-5 hydrosilyl radicals in a molecule should just contain at least one kind.

[0025] (B) It is [0026] when compatibility or distributed stability with the (A) component, the (C) component, and the (D) component shows concretely as a comparatively good thing as a component.

[Formula 2]



( $2 \leq k \leq 5$ ,  $0 < l < 5$ , Rは炭素数8以上の炭化水素基)

[0027] \*\*\*\*\*

[0028] It is desirable to use it to the total amount of the alkenyl radical of the (A) component, as amount of the (B) component used in this invention, so that the silicon atomic union hydrogen atom of the (B) component may become 0.8-5.0Eq. It becomes inadequate constructing a bridge, when the silicon atomic union hydrogen atom o





		実施例 1	実施例 2	比較例 1
(A) 成分	化合物 A	g	100	100
(B) 成分	化合物 B 1	g	9.1	
	化合物 B 2	g		5.3
可塑剤	PG-380	g	50	
(C) 成分	#35	g	20	14
(D) 成分	ポリエチレン樹脂	μl	57	57
保存安定性改良剤	2-7-2-3-7-5-2-4-4	g	0.4	0.4
酸化防止剤	MARU AO-50	g	1	1
硬度 (HS-A)			12	28
体積抵抗率		Q cm	2.4x10 <sup>4</sup>	5.7x10 <sup>7</sup>

[0054]  
[Effect of the Invention] The hardenability conductivity constituent of this invention can form into a low degree of hardness the rubber-like elasticity object acquired without using a lot of oil etc. Therefore, the conductive platen of a low degree of hardness can be obtained by using this hardenability conductivity constituent as an elastic body.

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PRIOR ART

[Description of the Prior Art] As one application of a conductive ingredient, the various rollers which an electrophotography machine and a printer have are mentioned. As an elastic body of these rollers, although many EPDM, urethane, NBR, silicone, etc. are used, low degree-of-hardness-ization other than the property which each elastic body has has come to be needed.  
[0003] Moreover, although already opened to the public in JP,8-262866,A etc. about the conductive constituent using a saturated hydrocarbon system polymer or a polyoxyalkylene series polymer, in this conductive constituent, there was not the thing that has a not necessarily low degree of hardness but the need for the further reduction in a degree of hardness.

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## TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] this invention solves the problem of the reduction in a degree of hardness in the rubber-like elasticity object used for a conductive ingredient, without using a lot of oil etc., and risks, such as bleeding, are low — low — the conductive platen using the hardenability conductivity constituent and it which can acquire a degree of hardness rubber-like elasticity object is offered.

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JP,2000-309709.A [MEANS]

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vinyl dimethylmethoxysilane, A vinyl trimethyl silane, divinyl dimethoxysilane, divinyl dimethylsilane, 1, 3-divinyl - 1, 1, 3, and 3-tetramethyl disiloxane, TORIBI nil methylsilane, A tetravinyl silane, allyl compound dimethyl methoxysilane, an allyl compound trimethyl silane, Diaryl dimethoxysilane, diaryl dimethylsilane, gamma-methacryloyl oxypropyl trimethoxysilane, gamma-methacryloyl oxypropyl methyl dimethoxysilane, etc. are mentioned.

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[0017] As molecular weight of the above polyoxyalkylene series polymers, it is desirable that it is 1,000-40,000 at 500-50,000, and a pan in the viewpoint received the balance of reactivity and the reduction in a degree of hardness to number average molecular weight (Mn). Especially, to a with a number average molecular weight of 5,000 or more thing and a pan, what is 5,000-40,000 is desirable. When number average molecular weight is less than 500, and this hardenability constituent is stiffened, sufficient mechanical property (a rubber degree of hardness, elongation percentage) etc. becomes is hard to be acquired. It is in the inclination for hardening to become inadequate in many cases in order that the molecular weight per alkenyl radical contained in a molecule when number average molecular weight becomes not much large on the other hand too much may become large or reactivity may fall by steric hindrance, and for viscosity to become high too much, and for workability to worsen.

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3. In the drawings, any words are not translated.

## MEANS

[Means for Solving the Problem] in the hardenability ingredient which consists of components, such as a saturated hydrocarbon system polymer which has the alkenyl radical in which a hydrosilylation reaction is possible or a polyoxyalkylene series polymer, a curing agent which has a hydrosilyl radical, and a hydrosilylation catalyst, as for this invention persons, the number of hydrosilyl radicals makes hydrosilylation crosslinking density small, using 2-5 things as said curing agent — low — it came to complete a header and this invention for a degree of hardness rubber-like elasticity object being acquired.

[0006] namely, this invention — following component (A) - (D) — as an indispensable component — becoming - low — it is a conductive platen using the hardenability conductivity constituent and it which can acquire a degree of hardness rubber-like elasticity object.

(A) (Compound C) addition-of-conductivity (matter D) hydrosilylation catalyst which has 2-5 hydrosilyl radicals in the saturated hydrocarbon system polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible, or the polyoxyalkylene series (polymer B) molecule [0007]

[Embodiment of the Invention] The (A) component in the hardenability conductivity constituent of this invention is the saturated hydrocarbon system polymer or polyoxyalkylene series polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible. Here, it will not be restricted especially i said alkenyl radical is a radical including carbon-carbon duplex association which has activity to a hydrosilylation reaction. As an alkenyl radical, ring type unsaturated hydrocarbon radicals, such as aliphatic series partial saturation hydrocarbon groups, such as a vinyl group, an allyl group, a methylvinyl radical, a propenyl radical, a butenyl group, a pentenyl radical, and a hexenyl radical, a cyclo propenyl radical, a cyclo butenyl group, a cyclo pentenyl radical, and a cyclohexenyl group, an methacrylic radical, etc. are mentioned.

[0008] (A) As for a component, it is desirable to introduce into the polymer end the alkenyl radical in which the above-mentioned hydrosilylation reaction is possible. Thus, when an alkenyl radical is in a polymer end, it is desirable from points, like the rubber-like hardened material of high intensity becomes the effective network chain density of the hardened material finally formed increases, and is easy to be obtained.

[0009] By this invention, a saturated hydrocarbon system polymer is a concept meaning the polymer which does not contain carbon-carbon unsaturated bonds other than a ring substantially, and means that the repeat unit which constitutes the principal chain except this alkenyl radical consists of hydrocarbon groups. (A) The polymer which makes the frame of the saturated hydrocarbon system polymer of a component (1) It carries out a polymerization, using the olefin compound of the carbon numbers 2-6, such as ethylene, a propylene, 1-butene, and an isobutylene, as the main monomer. (2) Although it can obtain by the approach of hydrogenating after carrying out homopolymerization of the diene series, such as a butadiene and an isoprene, or carrying out copolymerization of the above-mentioned olefinic compound and the diene series It is desirable that it is the polyisobutylene system polymer from the point of being able to make [ many ] the number of end functional groups, hydrogenation poly-butadiene system polymer, or hydrogenation polyisoprene system polymer which is easy to introduce a functional group into an end and which is easy to carry out molecular-weight control.

[0010] the monomeric unit in which all the monomeric units may be formed in from the isobutylene unit, and said polyisobutylene system polymer has an isobutylene and copolymeric — a polyisobutylene system polymerization — the inside of the body is desirable and you may contain in 20% or less of range preferably especially 30% or less still more preferably below 50% (% of the weight and the following — the same).

[0011] As a monomer component which has copolymeric [ said / isobutylene and copolymeric ], the olefin of carbon numbers 4-12, vinyl ether, an aromatic series vinyl compound, vinylsilane, and arylsilane are mentioned, for example, As an example of such a copolymer component, for example 1-butene, 2-butene, A 2-methyl-1-butene, a 3-methyl-1-butene, a pentene, 4-methyl-1-pentene, A hexene, a vinyl cyclohexane, the methyl vinyl ether, ethyl vinyl ether, isobutyl vinyl ether, styrene, alpha methyl styrene, dimethyl styrene, p-t-butoxy styrene p-hexenyloxy styrene, p-ant ROKISHI styrene, p-hydroxystyrene, beta-pinene, an indene,

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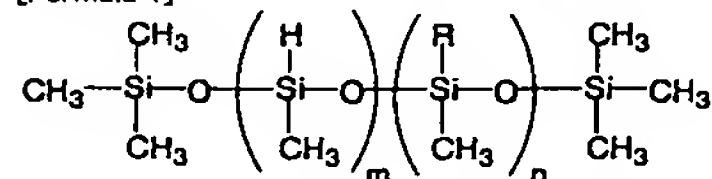
JP,2000-309709.A [MEANS]

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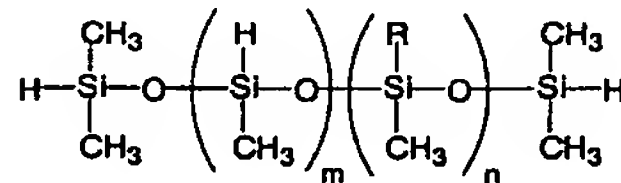
hydrogen atoms have combined with the same silicon atom, a hydrosilyl radical calculates it with two pieces.

[0021] (B) As a component, although a polyorgano hydrogen siloxane is desirable, it is mentioned as one. A polyorgano hydrogen siloxane here points out the siloxane compound which has a hydrocarbon group or a hydrogen atom on a silicon atom. It is [0022] when the structure is shown concretely.

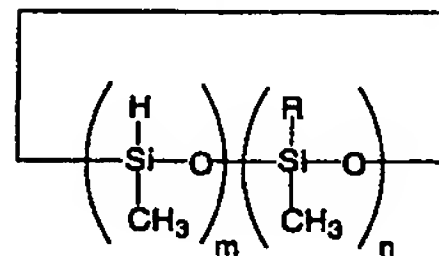
[Formula 1]



( $2 \leq m+n \leq 50$ ,  $2 \leq m \leq 5$ ,  $0 \leq n$ , Rとしては主鎖の炭素数が2～20の炭化水素で1個以上のフェニル基を含有してもよい。)



( $0 < m+n \leq 50$ ,  $0 \leq m \leq 3$ ,  $0 \leq n$ , Rとしては主鎖の炭素数が2～20の炭化水素で1個以上のフェニル基を含有してもよい。)



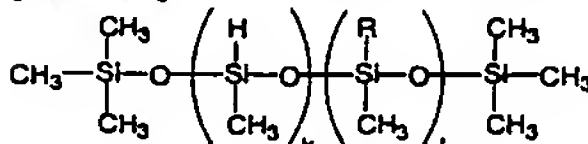
( $3 \leq m+n \leq 20$ ,  $2 \leq m \leq 6$ ,  $0 \leq n < 18$ , Rとしては主鎖の炭素数が2～20の炭化水素で1個以上のフェニル基を含有してもよい。)

[0023] The shape of a chain shown by \*\*\* and an annular thing are mentioned.

[0024] Moreover, if in charge of use of these (B) components, what has good compatibility with the (A) component, the (C) component, and the (D) component or the distributed stability in a system is desirable. When especially the viscosity of the whole system is low and what has compatibility low as a (B) component with each above-mentioned component is used, phase separation happens and poor hardening may be caused. Moreover, a filler with small particle size, such as an impalpable powder silica, may be blended as a dispersibility assistant. Furthermore, in order to improve the conductive tuck and the reinforcement of a rubber-like elasticity object which are obtained, two or more sorts of curing agents may be used together. In this case, there is especially no limit in the curing agent used together that the compound which has 2-5 hydrosilyl radicals in a molecule should just contain at least one kind.

[0025] (B) It is [0026] when compatibility or distributed stability with the (A) component, the (C) component, and the (D) component shows concretely as a comparatively good thing as a component.

[Formula 2]



( $2 \leq k \leq 5$ ,  $0 < l < 5$ , Rは炭素数8以上の炭化水素基)

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\*\*\*\*\*.  
[0027] \*\*\*\*\*.  
[0028] It is desirable to use it to the total amount of the alkenyl radical of the (A) component, as amount of the (B) component used in this invention, so that the silicon atomic union hydrogen atom of the (B) component may become 0.8-5.0Eq. It becomes inadequate constructing a bridge, when the silicon atomic union hydrogen atom of the (B) component does not fulfill 0.8Eq to the alkenyl radical total amount of the above-mentioned (A) component. Moreover, in exceeding 5.0Eq, it poses a problem that physical properties change with the effects of the silicon atomic union hydrogen atom which remains after hardening a lot. It is desirable to use the (B) component to the total amount of the alkenyl radical of the (A) component, so that the silicon atomic union hydrogen atom of the (B) component may become 1.0-2.0Eq to control especially this effect.  
[0029] The (C) component in the hardenability conductivity constituent of this invention is a component for giving conductivity to the rubber-like elasticity object acquired from the hardenability conductivity constituent of this invention which uses a saturated hydrocarbon system polymer or a polyoxyalkylene series polymer as a principal component. A compound called antistatic agents, such as a compound which has the conductive unit further represented with carbon black metallurgy group oxide, metal impalpable powder, the organic compound that has quaternary ammonium salt, a carboxylic-acid radical, a sulfonic group, a sulfate radical, a phosphoric ester radical, etc. or a polymer, ether ester imide or an ether imide polymer, an ethyleneoxide-epihalohydrin copolymer, methoxy polyethylene-glycol acrylate, etc. as this addition-of-conductivity matter, or a high molecular compound, is mentioned. As an example of the above-mentioned carbon black, furnace black, acetylene black, lamp black, channel black, thermal black, oil black, etc. are mentioned.  
[0030] Although there is no limit in the class of addition-of-conductivity matter including these carbon black, particle size, etc., it is desirable to add so that the resistance field of the conductive rubber-like elasticity object acquired from the hardenability conductivity constituent of this invention may serve as 105-ohmcm - 1013-ohmcm. (C) the addition of a component -- the polymer 100 weight section of the (A) component -- receiving - further 1 - \*\*\* for the 0.1 - 200 weight section and the 100 weight sections -- things are desirable. If there are too few additions, it will become easy to come to the conductivity of the conductive constituent after hardening out of variation, and if an addition increases too much, the fluidity of a constituent will be spoiled, and the fall of workability will be caused.  
[0031] In addition, since there are some which check a hydrosilylation reaction depending on the class or addition of the addition-of-conductivity matter to be used, the effect to the hydrosilylation reaction of the addition-of-conductivity matter must be taken into consideration.  
[0032] About the hydrosilylation catalyst which is the (D) component of this invention, there is especially no limit and it can use the thing of arbitration. the thing: platinum-vinyl siloxane complex which made support, such as chloroplatinic acid, a simple substance of platinum, an alumina, a silica, and carbon black, support solid-state platinum when illustrating concretely -- (--- for example Pt<sub>n</sub>(ViMe<sub>2</sub>SiOSiMe<sub>2</sub>Vi)<sub>n</sub> and a Pt[(MeViSiO)<sub>4</sub>]<sub>m</sub>]; platinum-phosphine complex -- (--- for example a Pt (PPh<sub>3</sub>)<sub>4</sub> and Pt(PBu<sub>3</sub>)<sub>4</sub>); platinum-phosphite complex -- (--- for example Pt[P(OPh)<sub>3</sub>]<sub>4</sub> and Pt[P(OBu)<sub>3</sub>]<sub>4</sub> (the inside of a formula, and Me -- a methyl group --) In Bu, butyl and Vi express a vinyl group, Ph expresses a phenyl group, and n and m express an integer. The platinum alcoholate catalyst indicated in Lamoreaux's and others U.S. Pat. No. 3220972 specification is also mentioned to the platinum-hydrocarbon complex indicated in U.S. Pat. No. 3159601 of Pt (acac)<sub>2</sub>, and Ashby and others, and a No. 3159662 specification, and a list. Moreover, as an example of catalysts other than a platinum compound, RhCl (PPh<sub>3</sub>)<sub>3</sub>, RhCl<sub>3</sub>, Rh/aluminum 2O<sub>3</sub>, RuCl<sub>3</sub>, IrCl<sub>3</sub>, FeCl<sub>3</sub> and AlCl<sub>3</sub>, PdCl<sub>2</sub>.2H<sub>2</sub>O, NiCl<sub>2</sub>, TiCl<sub>4</sub>, etc. are mentioned. These catalysts may be used independently and may be used together two or more sorts. Chloroplatinic acid, a platinum-olefin complex, a platinum-vinyl siloxane complex, and Pt(acac)<sub>2</sub> grade are desirable from the point of catalytic activity.  
[0033] (D) Although there is especially no limit as an amount of catalysts of a component, it is good to use in 10-1 to ten - eight mols to one mol of alkenyl radicals in the (A) component. Furthermore, it is good to use in 10-2 to ten - six mols preferably. It is better not to use ten - one mols or more to one mol of alkenyl radicals in the (A) component, since a hydrosilylation catalyst is generally expensive, and it is corrosive, and hydrogen gas is generated in large quantities and a hardened material may foam.  
[0034] Since the hardenability constituent of this invention is hardened by the addition reaction of the hydrosilyl radical (Si-H radical) to the alkenyl radical which used the precious metal catalyst, its cure rate is very quick, and when performing Rhine production, it is convenient.  
[0035] Moreover, a preservation stability amelioration agent can be used for the hardenability conductivity constituent of this invention. It is not limited especially that to be the usual stabilizer known as a preservation stabilizer of the (B) component of this invention as this preservation stability amelioration agent, and what is necessary is just what attains the desired end. Specifically, the compound containing an aliphatic series

level with a metal plate, adds a 500g load to each of the both ends of the conductive shaft of a roller in the direction of a metal plate, impresses the direct current voltage of 100 volts between a shaft and a metal plate, and is measured.

[Translation done.]

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unsaturated bond, an organic phosphorous compound, an organosulfur compound, a nitrogen content compound, a tin system compound, organic peroxide, etc. can be used suitably. Still more specifically 2-benzothiazolyl sulfide, benzothiazole, A thiazole, dimethyl acetylene die carboxylate, diethyl acetylene die carboxylate, Butylhydroxytoluene, burylhydroxyanisole, vitamin E, 2-(4-mol FOJl nil dithio) benzothiazole, 3-methyl-1-butene-3-oor, An acetylene nature partial saturation radical content ORGANO siloxane, an ethylene nature partial saturation radical content ORGANO siloxane, Although acetylene alcohol, 3-methyl-1-butyl-3-oor, diallyl fumarate, diallyl maleate, diethylfumarate, diethyl maleate, dimethyl maleate, 2-pentene nitril, 2, and 3-dichloropropene etc. is mentioned It is not necessarily limited to these.  
[0036] Moreover, to the hardenability conductivity constituent of this invention, the adhesion grant agent for raising the adhesive property over various base materials (the metal heart, plastic film, metal foil, paper, etc.) an a tackifier can be added if needed. As an example of an adhesion grant agent, various silane coupling agents, an epoxy resin, etc. are mentioned. The effect of especially the silane coupling agent that has functional groups, such as an epoxy group, a methacryloyl radical, and a vinyl group, affect hardenability is also small, and it is easy to use effectiveness also for an adhesive manifestation greatly. However, it is not limited to these as a silane coupling agent which can be used. Moreover, it can use together with a silane coupling agent or an epoxy resin, and these reaction catalysts can be added. If in charge of these use, the effect to a hydrosilylation reaction must be taken into consideration. Moreover, there is especially no limitation in a tackifier and it can usually use what is used as a tackifier for it. As an example, phenol resin, denaturation phenol resin, cyclopentadiene-pheno resin, xylene resin, cumarone resin, petroleum resin, terpene resin, terpene phenol resin, rosin ester resin, etc. are mentioned. Especially in these, terpene system resin and petroleum resin of compatibility are good, and sinc the adhesion property is good, it is desirable. Moreover, to the hardenability conductivity constituent of this invention, various bulking agents, an antioxidant, an ultraviolet ray absorbent, a pigment, a surfactant, a solvent, and a silicon compound may be added suitably. As an example of said bulking agent, silica impalpable powder, a calcium carbonate, clay, talc, titanium oxide, a zinc white, the diatom earth, a barium sulfate, etc. are mentioned. Especially in these bulking agents, silica impalpable powder and the impalpable powder silica whose particle diameter is especially 50-70nm (BET specific surface area is 50-380m<sup>2</sup>/g) extent are desirable, and especially since the work to which the hydrophobic silica which performed surface treatment also in it improves reinforcement in the desirable direction is large, it is desirable.  
[0037] Moreover, viscosity and a degree of hardness may be adjusted to the hardenability conductivity constituent of this invention, or to it, a softener and a plasticizer may be added in order to stabilize resistance. Below the 150 weight sections of the amount of a softener and the plasticizer used are desirable to the (A) component 100 weight section. Problems, such as bleeding, may be produced if it becomes an addition beyond it

[0038] Although a conductive ingredient can be fabricated by liquefied injection molding, extrusion molding, pres forming, etc. using the hardenability conductivity constituent concerning above this inventions, liquefied injection molding is desirable also from the point that a constituent is liquefied, and the point of productivity.  
[0039] Moreover, the conductive platen concerning this invention is suitable for the various rollers which it is manufactured, using the above hardenability conductivity constituents as an elastic body, and an electrophotography machine and a printer have, for example, an electrification roller, a developing roller, an imprint roller, a feed roller, a cleaning roller, the pressurization roller for fixing, etc.  
[0040] Especially the manufacture approach of the above-mentioned conductive platen is not limited, but the molding approach of various well-known rollers can be conventionally used for it. For example, a conductive elastic layer is cast by casting the above-mentioned hardenability conductivity constituent to the metal mold which installed metal shafts, such as a product made from SUS, in the core by the various casting methods, such as extrusion molding, press molding, injection molding, reaction injection molding (RIM), liquefied injection molding (LIMS), and casting molding, and carrying out heat hardening to it by suitable temperature and time amount around a shaft. In this case, postcure of said hardenability conductivity constituent may be carried out after semi-hardening. Furthermore, single \*\* may prepare two or more layers in the outside of said conductive elastic layer if needed. For example, apply to predetermined thickness the resin which constitutes a surface layer by the spray coating cloth, DIP spreading, etc., it is made to dry and harden at predetermined temperature from on said conductive elastic layer, and a surface layer is prepared.  
[0041] The thing of the range whose roller resistance of the thing of the range whose roller resistance of the thing of the range whose roller resistance is 107-1011ohm is 103-109ohm as for example, an imprint roller is 105-1010ohm further as a developing roller as resistance of the above-mentioned conductive platen can be used for the application as for example, an electrification roller. In addition, the loadings of the addition-of-conductivity matter which is the (C) component in the above-mentioned hardenability conductivity constituent can adjust this roller resistance in the target range. Here, roller resistance is a value which applies a roller at a

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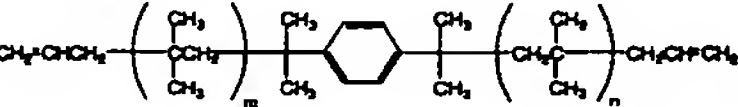
EXAMPLE

[Example] Although this invention is further explained to a detail based on the following examples, this invention is not limited only to these examples.

[0043] (Example 1) The compound A (an analysis value is shown in Table 1) which shows the following structure compounded as a (A) component according to the approach indicated by JP.8-134220.A as an example 3 of manufacture was used.

[0044]

[Formula 3]



(m, nは整数) : 化合物 A

[0045]

[Table 1]

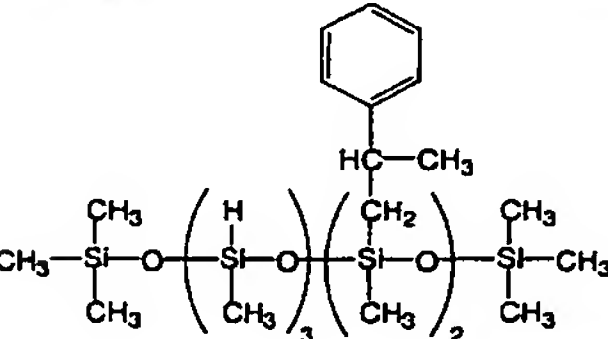
分析項目	測定方法	測定値
数平均分子量 (M <sub>n</sub> )	GPC	1 0 4 0 0
重量平均分子量 (M <sub>w</sub> )	GPC	1 2 1 0 0
分散度	GPC	1. 2
末端官能基数	<sup>1</sup> H-NMR	2. 0

注1) GPC測定値はポリスチレン換算

注2) <sup>1</sup>H-NMR測定による末端官能基数は、開始剤残基に対する末端官能基数を示す。

[0046] First, it is MARK as a (C) component to the (A) component 100 weight section as the carbon black (Asahi carbon company make #35) 14 weight section and an antioxidant. The AO-50(product made from the Asahi electrification) 1 weight section was mixed, and it kneaded 3 times with a roll. Subsequently, the compound B1 which shows structure below to this mixture as a (B) component [0047]

[Formula 4]



: 化合物 B 1

[0048] 9.1 weight sections mixing was carried out to the (A) component 100 weight section so that the silicon atomic union hydrogen atom of the compound B1 of the (B) component might become 2Eq to the alkenyl radical total amount of the (A) component. furthermore -- as the (D) component -- a bis(1, 3-divinyl - 1, 1, 3, and 3-tetramethyl disiloxane) platinum complex compound catalyst (17.8x10<sup>-5</sup> mmol/mu l --) Platinum carried out

